

Request for Economic Stimulus Funds

Concept Proposal

Submitters (Name of Workgroup & Chair/Co-Chairs): **Energy and Sustainability (Dr. Doug Whitlock and Dr. Jim Tracy)**

Project Title: **Next Generation Ultra-low Emission Coal-fired Heating Plant**

Project Partners (Known or Anticipated): **The Institute for Combustion Science and Technology (ICSET) at WKU, U.S. Department of Energy, Enercon Systems, Inc., and Facilities Management.**

Project Background & Purpose (Justification for Project): The total heat requirement for the WKU heat plant is approximately 100 million Btu/hr (46+50+20). WKU is able to comply with the emissions standards based on fuel sampling (fuel analysis). WKU must currently purchase the expensive coal (sulfur content less than 1%) to meet the Clean Air Act requirements for sulfur dioxide and acid rain precursor pollutants. Within the next 20 years, the existing coal-fired boilers will not be able to meet the more restrictive emission regulations for hazardous air pollutants and carbon monoxide (CO). WKU anticipates increased environmental performance standards (Industrial Boiler MACT, clean air/multi-pollutant legislation) will require WKU to replace existing boilers to meet these obligations.

The first commercial demonstration unit for flue gas recirculating-fluidized bed boiler has been set up at Cedar Lane Farms in Ohio and it has been running for the past five years. The features of the FGR-FBC system area: low stack emissions, low limestone consumption, high thermal efficiency (87%), and no bed heat transfer tubes, flue gas recirculation and automatic PLC control. The specific advantages for WKU are: (1) this unit will offer more flexibility in fuels and improves our local economy and acid rain pollutants (SO₂ and NO_x) can be controlled by using local Kentucky limestone to meet sulfur dioxide limits and lower operating temperatures to reduce NO_x. (2) There would be a significant reduction in emissions of hazardous air pollutants such as mercury, hydrochloric acid and others. (3) 20% reduction in coal usage compared with old under-grate stokers. (4) lower labor costs to operate the system. **(5) The most important feature of the FBC system is the ability to co-fire wood chips (or other waste materials) up to 30% with high sulfur coal. In comparison to burning only coal, this co-firing system will also reduce greenhouse gas emissions (carbon dioxide) by 30%.**

ICSET will be involved in the improvement of the FBC system and implement the mercury and other pollutants control technology at this unit. This new boiler system may eventually be used

as a model for other universities. This strategy allows WKU to improve its environmental sustainability performance, become a stronger steward of the environment, improve the local economy and reduce operating costs which improves the availability of funds for higher education.

Project Description (General Goals & Implementation Strategies):

Construction of 3 AFB units (40 million Btu/hr for one unit) will replace the existing boilers at WKU. The construction request includes financing and permitting, foundations and buildings, freight to site, installation, mechanical and electrical compliance Stack Testing, and R&D for pollutions control.

Project Team (Project Manager(s), Content Experts, Instructional Designers, etc.): Dr. Wei-Ping Pan, Dr. Yan Cao, Mr. Mark Cohron (technical person at ICSET), visiting scholars, facilities management (overseen by Mr John Osborne), Department of Energy personnel and Enercon Systems, Inc.

Project Budget & Amount of Economic Stimulus Funds Requested:

	Stimulus Package
Construction of 3 AFB Units (40 million Btu/hr for one unit)	\$8,000.000
Financing, permitting, foundations & Bldgs, freight, installation, And compliance testing	\$8,000,000 - \$12,000,000
Total cost:	\$16,000,000 to \$20,000,000